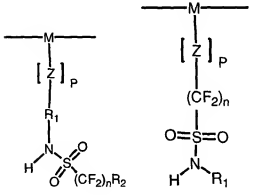
We claim:

1. A negative resist composition comprising a polymer, the polymer comprising at least one fluorosulfonamide monomer unit having one of the following two formulae:



wherein:

M is a polymerizable backbone moiety;

Z is a linking moiety selected from the group consisting of -C(O)O-, -C(O)-, -OC(O)-, -O-C(O)-C(O)-O-, or alkyl;

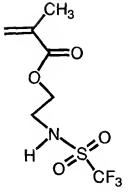
P is 0 or 1;

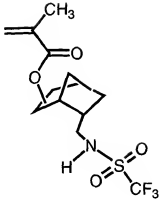
$R_1$ is a linear or branched alkyl group of 1 to 20 carbons;

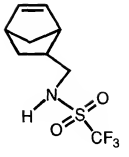
$R_2$ is hydrogen, fluorine, a linear or branched alkyl group of 1 to 6 carbons, or a semi- or perfluorinated linear or branched alkyl group of 1 to 6 carbons; and

n is an integer from 1 to 6.

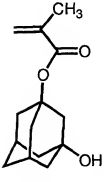
2. The negative resist composition of Claim 1, wherein the fluorosulfonamide monomer unit is selected from the group consisting of:



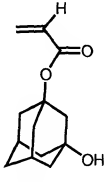




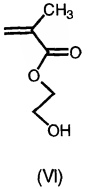
3. The negative resist composition of Claim 1, wherein the polymer further comprises a co-monomer unit selected from the group consisting of:



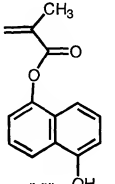
(IV)



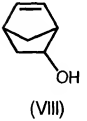
(V)



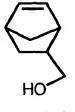
(VI)



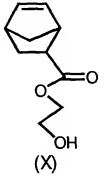
(VII)



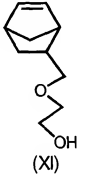
(VIII)



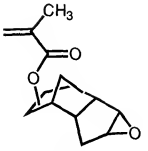
(IX)



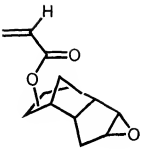
(X)



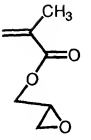
(XI)



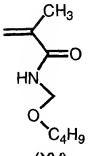

(XII)



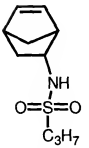

(XIII)




(XIV)




(XV)




(XVI)

4. The negative resist composition of Claim 1, further comprising a radiation sensitive acid generator.

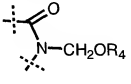
5. The negative resist composition of Claim 4, wherein the radiation sensitive acid generator is selected from the group consisting of onium salts, succinimide derivatives, diazo compounds, and nitrobenzyl compounds.

6. The negative resist composition of Claim 4, wherein the radiation sensitive acid generator is selected from the group consisting of 4-(1-butoxynaphthyl)tetrahydrothiophenium perfluorobutanesulfonate, triphenyl sulfonium perfluorobutanesulfonate, t-butylphenyl diphenyl sulfonium perfluorobutanesulfonate, 4-(1-butoxynaphthyl)tetrahydrothiophenium perfluorooctanesulfonate, triphenyl sulfonium perfluorooctanesulfonate,

t-butylphenyl diphenyl sulfonium perfluorooctanesulfonate, di(t-butylphenyl) iodonium perfluorobutane sulfonate, di(t-butylphenyl) iodonium perfluorohexane sulfonate, di(t-butylphenyl) iodonium perfluoroethylcyclohexane sulfonate, di(t-buylphenyl)iodonium camphoresulfonate, and perfluorobutylsulfonyloxybicylo[2.2.1]-hept-5-ene-2,3-dicarboximide.

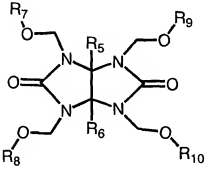
7. The resist composition of Claim 1, further comprising at least one of a solvent, a crosslinking agent, a quencher, and a surfactant.

8. The resist composition of Claim 7, wherein the crosslinking agent comprises two or more of the following moiety:




where $R_4$ represents hydrogen, or a linear or branched alkyl group, or an aromatic group.

9. The resist composition of Claim 8, wherein the crosslinking agent comprises:



where $R_5$-$R_{10}$ each represent hydrogen, or a linear or branched alkyl group, or an aromatic group.

10. The resist composition of Claim 9, wherein $R_5$-$R_{10}$ each represent hydrogen, or a linear or branched alkyl group of 1 to 8 carbons, or aryl hydrocarbon group of 6 to 9 carbons.

11. The resist composition of Claim 7, wherein the resist composition comprises (i) about 1 to about 30 wt. % of the polymer, (ii) about 1 to about 30 wt. % of crosslinking agent, based on the total weight of the polymer, (iii) about 0.5 to about 20 wt. % of photoacid generator, based on the total weight of the polymer, and (IV) a solvent which is present in an amount of about 70 to about 99 wt. % of the composition.

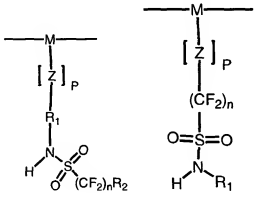
12. The resist composition of Claim 7, wherein the resist composition comprises (i) about 5 to about 15 wt. % of the polymer, (ii) about 3 to about 10 wt. % of crosslinking agent, based on the total weight of the polymer, (iii) about 0.5 to about 10 wt. % of photoacid generator, based on the total weight of the polymer, and (IV) a solvent which is present in an amount of about 85 to about 99 wt. % of the composition.

13. A method of forming a patterned material layer on a substrate, the method comprising:

(a) providing a substrate having a material layer on a surface;

(b) applying a resist composition to the substrate to form a resist layer on the material layer, the resist composition comprising a polymer, the polymer

comprising at least one fluorosulfonamide monomer unit having one of the following two formulae:



wherein:

M is a polymerizable backbone moiety;

Z is a linking moiety selected from the group consisting of -C(O)O-, -C(O)-, -OC(O)-, -O-C(O)-C(O)-O-, or alkyl;

P is 0 or 1;

$R_1$ is a linear or branched alkyl group of 1 to 20 carbons;

$R_2$ is hydrogen, fluorine, a linear or branched alkyl group of 1 to 6 carbons, or a semi- or perfluorinated linear or branched alkyl group of 1 to 6 carbons; and

n is an integer from 1 to 6;

(c) patternwise exposing the resist layer to imaging radiation;

(d) removing portions of the resist layer not exposed to the imaging radiation in step (c) to create spaces in the resist layer corresponding to the pattern; and

(e) removing portions of the material layer at the spaces formed in step (d), thereby forming the patterned material layer.

14. The method of Claim 13, wherein portions of the resist layer are removed by contacting the resist layer with an aqueous alkaline developer solution, whereby portions of the resist layer not exposed to the imaging radiation are dissolved by the developer solution to create spaces in the resist layer corresponding to the pattern.

15. The method of Claim 14, wherein the aqueous alkaline developer solution is 0.263 N tetramethyl ammonium hydroxide.

16. The method of Claim 13, wherein the material layer is selected from the group consisting of ceramic, dielectric, metal and semiconductor layer.

17. The method of Claim 13, wherein the imaging radiation is 193nm radiation.

18. The method of Claim 13, wherein the imaging radiation is 157nm radiation.

19. The method of Claim 13, wherein portions of the material layer are removed by etching into the material layer through spaces formed in the resist layer.

20. The method of Claim 13, wherein portions of the material layer are removed using reactive ion etching.